

Perspectives. Research and tips to support science education

Action Research: Inquiring Into Science Teaching and Learning

By Sandra K. Abell

My colleague has been raving about her study group—because of it, she is doing research in her classroom about student science learning. That word “research” seems intimidating to me, yet I am intrigued by the possibilities.

Why should I be interested in action research?

Teachers and schools are required by the No Child Left Behind Act to use research-based instructional practices. Although we often think of research as something university professors do, teachers can contribute to the research base on effective instruction by conducting research in their own classrooms. This may seem intimidating on the surface; yet teaching by its very nature is an inquiry-oriented process. Teachers try out various strategies to see what works with their students. They collect evidence of student learning and make instructional decisions based on that evidence. More important, teachers have unique insight into classrooms and can explore questions that are not accessible to “outsiders” like university researchers. For example, when I was coteaching a fifth-grade science class with Marie Roth, we were surprised during a classroom discussion to find students who seemed to misunderstand the model of trophic levels that we had derived from their study of a classroom ecosystem. By analyzing video footage of the discussion and examining student drawings from a later lesson, we were able to learn about how students make sense of scientific models and rethink our future instruction (Abell and Roth 1995). We were conducting action research about science teaching and learning!

What is action research?

According to university teacher educators who have encouraged teachers to be researchers, teacher research is intentional and systematic inquiry into classrooms (Cochran-Smith and Lytle 1993). Although teachers embed elements of research such as formative assessment and reflection on practice into their everyday teaching, teacher research is qualitatively different in that it involves



the intentional act of setting out to answer a particular question through the systematic analysis of various kinds of data (Roberts, Bove, and van Zee 2007). For example, first-grade teacher Ginger Stovall conducted a study of students' ideas about animals by interviewing each of her students (Stovall and Nesbit 2003). When we add the word “action” to describe research done by teachers, the implication is that, as a result of inquiry into classrooms, teachers will take action to improve their instruction. Stovall used what she had found out about student ideas about animals to plan interventions that would challenge their misconceptions. In another action research project, kindergarten teacher Marletta Iwasyk (1997) investigated student discussions of shadows. What she found encouraged her future actions: “making a special effort to draw in the ‘quiet ones’ and encourage student leaders to do the same” (p. 46).

I have found that many teachers fear the word “research” until they find that action research questions originate from their own classroom wonderings; that research designs do not have to include control and experimental groups; and that data sources can include observing, listening, and examining student work (Abell, Smith, and Volkmann 2004).

What are the potential benefits and pitfalls?

Benefits from action research include improving both teacher and student learning and adding to the research base about science instruction. Roth (2007) examined 19 studies of teacher learning among individuals engaged in

action research and concluded that doing action research is a powerful form of professional development. When teachers take actions based on their research findings, it is logical that student science learning should also benefit. For example, Phyllis Whitin (Whitin and Whitin 1997) tells how she helped her students learn to observe more carefully while carrying out a study of student learning in a fourth-grade classroom. Although much action research is meant to benefit only the teacher researcher or be shared with a small study group, a number of teacher researchers have shared their findings with a national audience (e.g., Roberts, Bove, and van Zee 2007). Their action research has generated knowledge that benefits others. For example, classroom teacher Karen Gallas (1995) documented the progress that first- and second-grade students made in their science talks over an entire year and published a book about her research that has helped other teachers implement science talks in their classrooms.

Even with these potential benefits in mind, action research can be problematic. Being both a teacher and a researcher takes time and can involve conflicting goals. For example, the aim of a teacher researcher in conducting an interview might be to understand how a student thinks about a particular science concept, while the aim of the teacher in the same situation might be to help the student learn that concept. Teacher researchers have to recognize when their research conflicts with their teaching. They can learn how to cope with conflicts by reading studies by teacher researchers who have successfully negotiated both roles in their classrooms. Of bigger concern is the quality of the action research itself. Roth (2007) analyzed 78 published science action research studies. She found that most teacher research findings led to validating instructional practices rather than confronting the status quo. For action research to be most effective at catalyzing change, researchers must look deeply into student learning and challenge themselves to continually question and improve their instruction.

How do I get started?

If you are intrigued by the possibilities of action research and want ideas about next steps, I recommend learning from those who have preceded you. Several good books about the action research process give ideas for developing research questions, collecting and analyzing data, and sharing the results (e.g., Hubbard and Power 2003).

Articles and books published by teacher researchers (like the ones cited in this column) can serve as models for your own action research. Many successful teacher researchers have been a part of a study group in their schools or districts (e.g., Fix et al. in Roberts, Bove, and van Zee 2007). Other teacher researchers have formed close partnerships with university researchers (Abell and Roth 1995; Stovall and Nesbit 2003; Whitin and Whitin 1997). I encourage you to find like-minded others who can support you through the action research process.

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